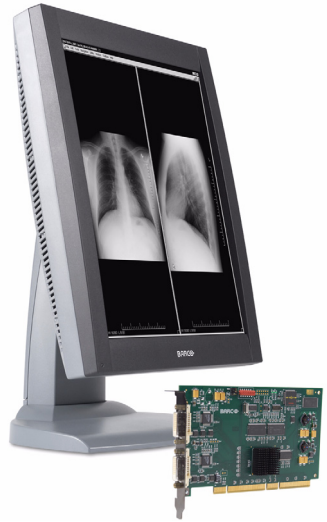


Nio MKII



Installation & User Manual

Supported displays:

E-2621, E-3620, MDNG-5121

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Preface

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Notice

Although every attempt has been made to achieve technical accuracy in this document, we assume no responsibility for errors that may be found. Our goal is to provide you with the most accurate and usable documentation possible; if you discover errors, please let us know.

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FCC Compliance Information (display)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian notice

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

Disposal Information

The lamps inside the display contain mercury. Do not throw the display in the trash. Dispose of it as required by local ordinances or regulations.

Safety Instructions

General Recommendations

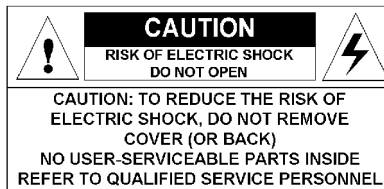
Read the safety and operating instructions before operating the display.

Retain safety and operating instructions for future reference.

Adhere to all warnings on the display and in the operating instructions manual.

Follow all instructions for operation and use.

Electrical shock



Type of protection (electrical):

Display with external power supply: Class III equipment

Degree of safety (flammable anesthetic mixture):

Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

Non-patient care equipment

Equipment primarily for use in a health care facility that is intended for use where contact with a patient is unlikely.

Power connection - display with external power supply

- Power requirements: The display must be powered using a medical approved 12 VDC SELV power supply.
- The medical approved DC power supply must be powered by the AC mains voltage.

Power cords:

- Utilize a UL-listed detachable power cord, 3-wire, type SJ or equivalent, 18 AWG min., rated 300 V min., provided with a hospital-grade type plug 5-15P configuration for 120V application, or 6-15P for 240V application.
- Do not overload wall outlets and extension cords as this may result in fire or electric shock.
- Mains lead protection (U.S.: Power cord): Power cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs and receptacles.

Water and moisture

Never expose the display to rain or moisture.

Never use the display near water - e.g. near a bathtub, washbasin, swimming pool, kitchen sink, laundry tub or in a wet basement.

Ventilation

Do not cover or block the ventilation openings in the cover of the set. When installing the display in a cupboard or another closed location, heed the necessary space between the set and the sides of the cupboard.

Installation

Place the display on a flat, solid and stable surface that can support the weight of at least 3 displays. If you use an unstable cart or stand, the display may fall, causing serious injury to a child or adult, and serious damage to the equipment.

More warnings in the Installation chapter.

Operating precautions

Continuous operation of the display with the same image may result in some image sticking on the LCD panel. Over 10 hours operation with the same image content is not recommended.

Switching on DPMS on display and PC and activating a good screen saver may decrease the risk of image sticking (image retention).

This apparatus conforms to:

CE0120 (MDD 93/42/EEC class IIb product), IEC 60601-1, UL 60601-1, CAN/CSA C22.2 No. 601.01-M90 (c-UL), CCC GB4943-1995 (IEC 60950-1).

National Scandinavian Deviations for Cl. 1.7.2 :

Finland: "Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan"

Norway: "Apparatet må tilkoples jordet stikkontakt"

Sweden: "Apparaten skall anslutas till jordat uttag"

Explanation of symbols

Symbols on the display and / or power supply

On the display or power supply, you may find the following symbols:



Indicates compliance to the essential requirements of the Directive 93/42/EEC



Indicates the display is approved according to the UL regulations



Indicates the display is approved according to the c-UL regulations



Indicates the display is approved according to the DEMKO regulations



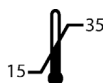
Indicates the display is approved according to the CCC regulations



Indicates the USB connectors on the display



Indicates the manufacturing date



Indicates the temperature limitations for the display to operate within specs



Indicates the display serial no.



Consult the operating instructions



Indicates this apparatus must not be thrown in the trash but must be recycled, according to the European WEEE (Waste Electrical and Electronic Equipment) directive

Symbols used throughout the manual:



Warning: Risk of injury to human beings



Caution: Risk of damage to the product



Important notice or remark



Note



Hint, tip



Additional information

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Overview

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Introduction

Thank you for choosing Barco.

Single display or complete system?

This manual describes installation and usage of a complete Nio system. A Nio system is a bundling of one or more displays and one or more display controllers.

However, if you have purchased the display only instead of a Nio system, please refer to the chapters in this manual covering the display, and disregard the information about the display controller or NioWATCH software.

The displays

The E-2621 is a 21.3-inch grayscale LCD display with a native resolution of 1600 x 1200.

The E-3620 is a 20.8-inch grayscale LCD display with a native resolution of 2048 x 1536.

The MDNG-5621 is a 21.3-inch grayscale LCD display with a native resolution of 2560 x 2048. It is available in a clearbase and bluebase version.

Their high-brightness, combined with image crispness and excellent viewing angle, makes them ideal for a multitude of medical applications and environments.

Long-term stabilization

The displays contain a Backlight Output Stabilization system (BLOS®), which continuously stabilizes the luminance output of the LCD's backlight. This improves the overall optical efficiency and provides long-term image confidence.

NioWatch

In Nio systems, the display comes standard with NioWATCH, a user-friendly software tool that optimizes the LCD panel for DICOM-compliant viewing.

Power saving

The displays are equipped with a power saving system. When left idle for a certain time, the computer connected to the display, will power down the display.

The power saving system can be switched on or off using the on-screen menus.

Tilt & swivel base

The versatile tilt & swivel foot allows to use the display for viewing portrait or landscape image resolutions.

The user can easily change the panel height and viewing angle, allowing to use the display in the optimal viewing conditions.

BarcoMed Nio display controller overview

The BarcoMed Nio Display Controller delivers a quality image with 1024 simultaneous shades of gray for medical viewing applications.

Minimum system requirements

- Pentium II 266 MHz with 128 MB RAM (Pentium II 800MHz with 256 MB RAM for cineloops)



Important: Other hardware and software installed in the system may require more system memory for best performance.

- PCI 3.0 compliant slot (PCI version) or
PCIe 1.1 compliant slot (PCIe version)
- Windows® XP Professional
Windows® 2000 Professional
Windows® Server 2003
Windows® XP Professional x64 Edition
Windows® Server 2003 x64 Edition

Features of the BarcoMed Nio display controller

- Portrait or landscape mode
- Dual head configuration
- 10-bit in/10-bit out LUT
- 1024 Simultaneous shades of gray
- Hardware cursor
- Displays VGA boot messages on **Nio** displays.
- 64-bit/66Mhz Single slot PCI card (PCI version)¹
- 64MB Video memory (PCI version)
- Single slot PCIe x8 card (PCIe version)²
- 128MB Video memory (PCIe version)

-
1. May be installed in a 32-bit/33Mhz PCI slot but with reduced performance.
 2. May be installed in a PCIe x16 slot, however not all PC Bios's support x8 cards in the x16 slot. Check with your PC manufacturer.

Supported resolutions for each head of the BarcoMed Nio display controller

- 1200 x 1600 @ 60 HZ (primary)
- 1600 x 1200 @ 60 Hz
- 1536 x 2048 @ 60 HZ (primary)
- 2048 x 1536 @ 60 Hz
- 2048 x 2560 @ 60 HZ (primary)
- 2560 x 2048 @ 60 Hz

The following resolutions are also available on head 1 when the OS is booted in VGA mode.

- 640x480 @ Default Refresh Rate, 16 colors (4-bit color), grayscale
- 800x600 @ Default Refresh Rate, 256 colors (8-bit color), grayscale

System Configuration Guidelines

Because of the low power consumption and low heat generation of the BarcoMed Nio display controller, multiple controllers may be installed in adjacent PCI/PCIe slots or adjacent to other PCI/PCIe boards. Additionally there should be no need to modify either the PC's power supply and/or cooling system.

Package contents

Nio System package

Each Nio system contains one or more display boxes (see below) and a system accessory box containing the following items:

- Display controller(s)
- CD-ROM with driver, NioWatch software and documentation

Display box

Each display box includes one display and a display accessory box containing the following items:

- Plastic cover of the tilt & swivel foot
- Power supply
- Digital video (DVI) cable (25-pins)
- Two velcro strips to bind the cables
- European power cord
- American power cord
- Chinese power cord
- This manual
- Quick install card

If some of the items are missing, please contact the reseller from whom you have purchased the unit.

Parts, controls and connectors

Front

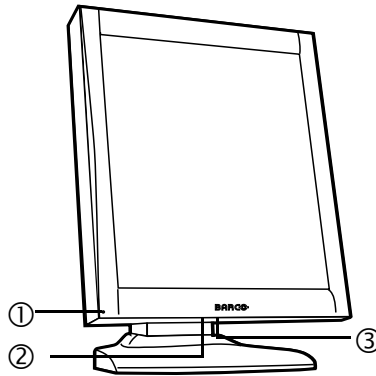


Figure 1: Front side

1. Power LED

The LED is **off** when the display is disconnected from the power. The LED is also off when the LED function is disabled in the on-screen display (OSD).

The LED is **green** when the display is on (when enabled in the on-screen menus).

The LED is **orange** when the display is in Stand-by power-saving mode.

2. USB downstream port. See also item "7." on page 27

3. Control wheel

The control wheel can be pressed like a push button and rotated like a knob.

It allows to put the display in stand-by, navigate through the on-screen display (OSD) menus and change values in the OSD.

Rear

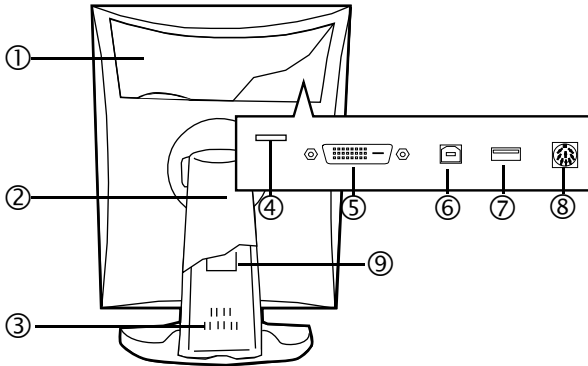


Figure 2: Rear side

1. Connector compartment cover

To get access to the connectors, remove the cover by pulling down the 2 clips at the top of the cover.

2. Tilt & swivel foot cover

This cover is packed in a separate box when the display is shipped to the customer.

3. Tilt & swivel foot

4. Slot for security cable (e.g., Kensington lock)

5. DVI (digital) video input

6. USB upstream port

Connect this connector to the PC USB bus if you wish to connect USB devices to the display's USB downstream port.

7. USB downstream port

When the display is connected to the PC USB bus, you can connect USB devices, such as keyboard, mouse, digital camera, to this connector.

8. DC power input

Connect the external power supply, delivered with the display, to this connector.

9. Tilt & swivel foot clip

The display is shipped with this clip in the foot to protect the tilt & swivel mechanism during transport. After unpacking, you should remove this clip.

Do not throw the clip away! Should the display have to be packed and shipped later, the clip must be applied to the foot again.

Installation


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Installation precautions

Precautions

- Keep your original packaging. It is designed for this display and is the ideal protection during transport.
- Avoid reflections in the flat panel to reduce eye strain.
- Place the display on a strong and stable table or desk.
- Keep the display away from heat sources and provide enough ventilation around the display.
- Do not use the display in direct sunlight.
- Do not scratch or apply pressure to the LCD panel. This may damage the panel permanently.

Display controller installation

 **Caution:** Wear a **grounded**, protective ESD strap during installation or handling of the display controller. Electrostatic charges can damage the display controller.

Prior to installing your BarcoMed Nio display controller(s) in your PC please take a few minutes to familiarize yourself with both the display controller(s) and the PCI slots in your computer.

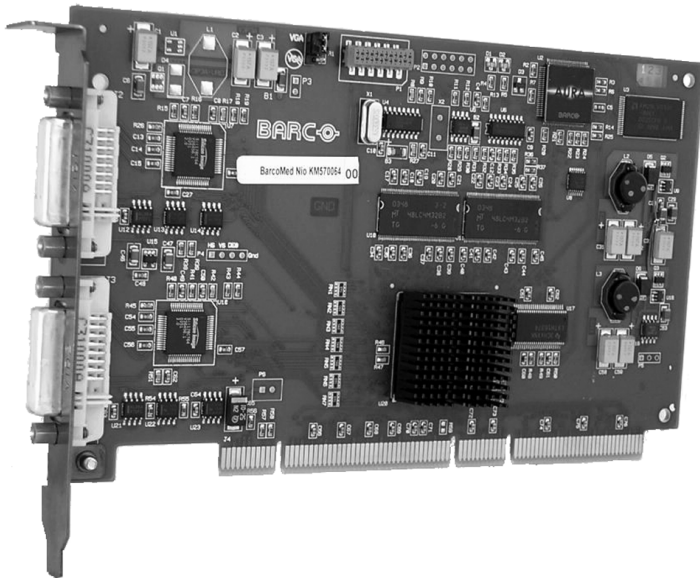


Figure 3: The BarcoMed Nio display controller

Using the VGA capabilities of the BarcoMed Nio display controller

Prior to installing the BarcoMed Nio controller, decide if you are going to use its on-board VGA capabilities. If you are, check the setting of the Jumper at J-1 on the display controller (see figure 4). By default, VGA should be enabled, on the top two pins.

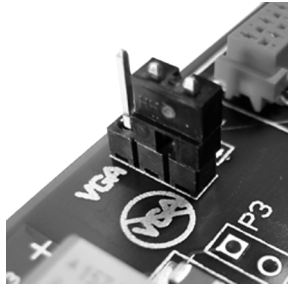



Figure 4

If you decide to use a separate VGA monitor as your boot monitor, you must disable the BarcoMed Nio's on-board VGA capabilities by moving the jumper to the bottom two pins.

 **Caution:** To use multiple BarcoMed Nio controllers in a single host with VGA enabled, you should enable VGA on only ONE of the BarcoMed Nio display controllers and disable VGA on ALL the other BarcoMed Nio display controllers.

Examples of PCI slots

Although the BarcoMed Nio is a 64-bit board, it may be installed in either a 64-bit or 32-bit PCI slot. However, installing it in a 32-bit PCI slot will result in a decrease in performance. Figure 5 illustrates the types of slots so that you can correctly identify which one to use for the BarcoMed Nio.

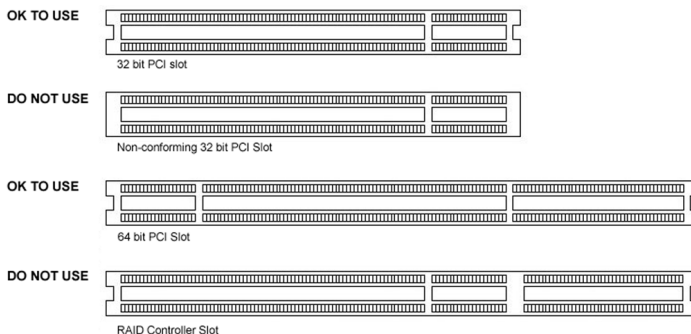


Figure 5: PCI and RAID Controller Slots

Installing the BarcoMed Nio display controller

Install the BarcoMed Nio controller in your computer following these steps:

1. Turn off the power to your computer and disconnect the power cord, however make sure that the computer chassis is **still grounded**.
2. Remove the chassis cover according to the manufacturer's instructions. Be sure to observe safety warnings.



If you have decided to use the on-board VGA capabilities of the BarcoMed Nio (see **Using the VGA capabilities of the BarcoMed Nio display controller** on page 32), you **must now remove** any VGA display controller(s) that are currently installed in the computer or **disable** any VGA controllers that are integrated into your PC's motherboard.

4. Install the BarcoMed Nio display controller into a free PCI slot, either 64-bit or 32-bit (see figure 5, for examples of slots). Be sure that the display controller is seated firmly in the slot.
5. Secure the card to the chassis with the PC's I/O panel mounting screw, and replace the chassis cover.
6. Connect the primary display to the connector marked "VID 1" on the BarcoMed Nio display controller using the provided DVI cable

(see figure 6). For a dual-headed BarcoMed Nio setup, connect the secondary display to the other connector on the display controller.

7. Reconnect the power cord, turn on the power, and boot the system as usual.

Running multiple BarcoMed Nio Display Controllers in a single host

The physical order of the displays may vary when you are running multiple BarcoMed Nio display controllers. This is due to the PC's PCI bus control in the system BIOS, and not the BarcoMed display controller. It may become necessary, depending on how your PC's BIOS configures the PCI bus, to switch your DVI display connections to achieve a linear desktop configuration.



Figure 6

BarcoMed PCI Express® Controllers

During the first quarter of 2006 Barco Medical Imaging Systems added PCI Express (PCIe) versions of its Nio display controllers to its grayscale

Medical Imaging Display Systems product line. The PCIe versions of these boards will have the same features as the currently shipping PCI version.

All three PCIe boards will feature a x8 logical bus on a x8 physical connector. They have been designed to function in PCI Express x8 or x16 slots. Optimum performance will always be obtained by installing them in a PCIe x8 slot. Depending on your PC manufacturer's implementation of the logic for the PCIe x16 slot optimum performance may also be obtained by installing the Barco PCIe boards in the PCIe x16 slot.

Connecting your Barco displays to your BarcoMed PCIe board is identical to connecting them to a BarcoMed PCI board (please refer to your system manual for details).

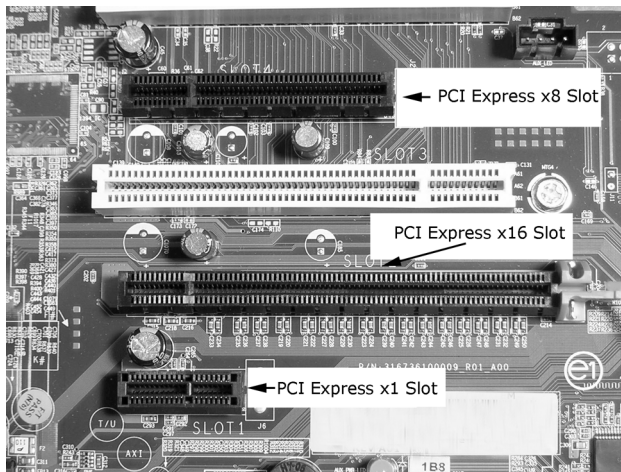


Figure 7: Examples of PCI Express Slots

Display installation

After unpacking the display



Important:

In the factory, the height-positioning system in the display foot is blocked with a red clip to prevent damage during transportation.

Before installing the display, you must remove this clip.

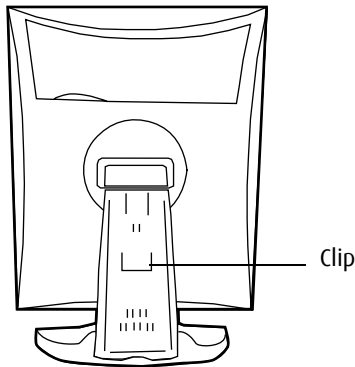


Figure 8

To remove the clip:

1. Position the display with its rear side facing you.
2. Pull the red clip out of the fixation holes in the foot.
3. Keep the clip in case the display needs to be shipped later.

Adjust the panel orientation

You can change the orientation of the panel at any time, but it is more convenient to select landscape or portrait orientation before connecting the cables.

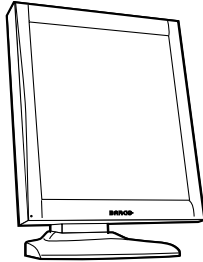


Figure 9:
Portrait
orientation

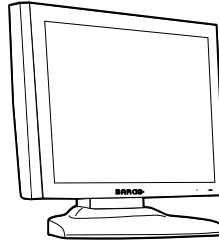


Figure 10:
Landscape
orientation

To change the panel orientation:

1. Stand at the front side of the panel and take the panel at both sides.



Very important: Tilt the panel before changing the orientation.

Should you change the panel orientation without tilting it first, you might irreversibly damage the tilt & swivel mechanism.

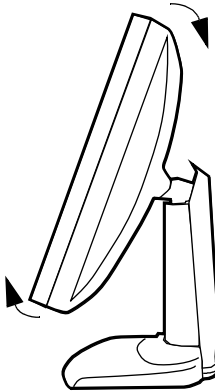


Figure 11: Tilt the panel before rotating

3. To change from portrait to landscape, turn the panel counterclockwise.

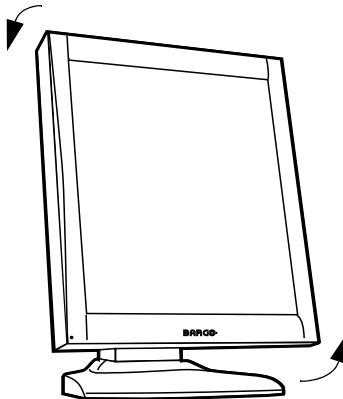


Figure 12: To rotate the panel from portrait to landscape

4. To change from landscape to portrait, turn clockwise.



Notice:

It, after installing the display or the system, you change the panel orientation while an image is on the screen, the result depends on your application:

- In a complete Nio system, the image orientation will adapt to the new panel orientation automatically after a second.
- If you would use the display without the Nio display controller board, the image orientation will not change with the panel orientation.

To change the orientation of the image, you will have to change the resolution in the Windows Display control panel (if possible).

Power connection

To connect the power:

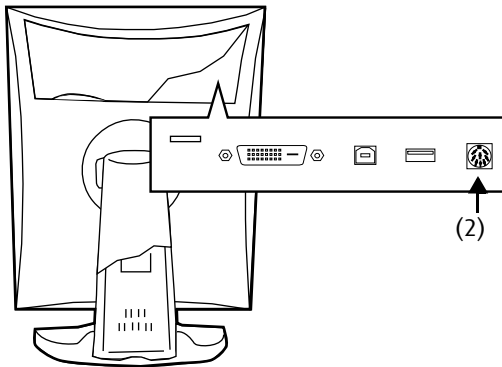


Figure 13

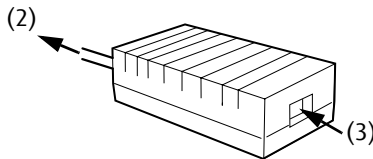


Figure 14

1. To get access to the connectors, remove the connector compartment cover by pulling down the 2 clips at the top of the cover.

2. Connect the output of the 12V DC power supply to the DC input of the display.
3. Connect one end of the proper power cable to the AC input of the 12V DC power supply.
4. Connect the other end of the power cord to a **grounded** power outlet.

Video connection

Connecting DVI cables: One display:

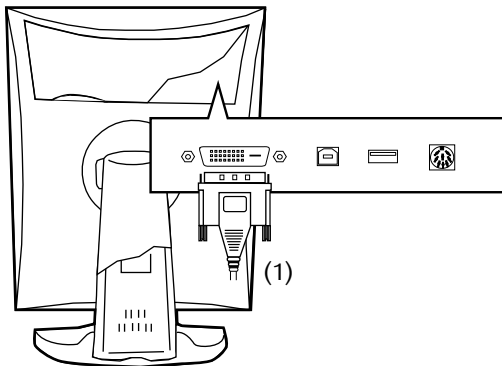


Figure 15

1. Connect one end of the DVI cable to the DVI input of the display.
2. Connect the other end of the DVI cable to the DVI connector of the display controller board. If this board has 2 video heads (2 video outputs), connect to output Vid 1 (Head A).

Connecting DVI cables: Two displays:

1. Connect the left display (when looking at the front side) to display controller output Vid 1 (Head A) as described above.
2. Connect the second display to output Vid 2 (Head B).

USB connection

The USB connection allows you to use the display as USB hub, to which you can connect USB devices, such as a keyboard, mouse or digital camera.

To connect the USB cable:

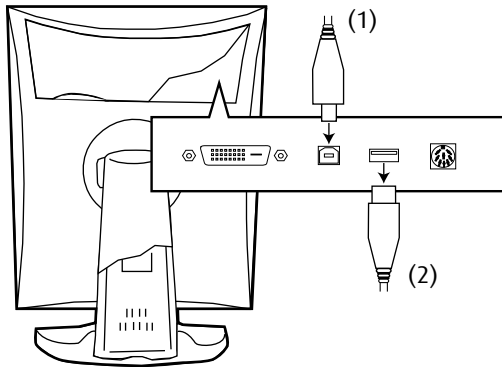


Figure 16

1. Connect a PC USB downstream connector to the display's USB upstream connector by means of a USB cable.
2. Connect any USB device to one of the display's USB downstream connectors.

Cable routing

Routing the signal cables

- Bind the cables in the connector compartment together with the cable tie inside the connector compartment.
- Put the connector compartment cover back on the display. Pay attention that the signal cables are positioned under the bulge in the cover.
- Push the cables into the clips on the rear of the tilt & swivel foot.

- Bind the cables together above and under the foot, by means of the 2 velcro strips attached to the inside of the foot cover (packed inside the accessory box).
- At last, put the foot cover back in place.

To put the foot cover in place:

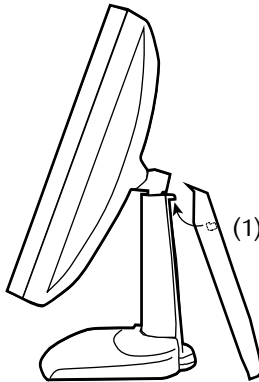


Figure 17

- 1.** Push the upper side of the cover onto the foot, so that the hooks inside the cover are positioned right under the bulges at the rear of the foot.
- 2.** Slide the cover upward while moving the lower side of the cover towards the foot.
- 3.** Press the cover to the foot so that it makes a clicking sound.

Attaching the display to an arm stand

The panel, standard attached to the tilt & swivel foot, is compatible with the VESA 100 mm standard. So it can be used with an arm stand according to the VESA 100 mm standard.

Therefore, the tilt & swivel foot must be removed from the panel.



Important:

- Use an arm that is approved by VESA (according to the VESA 100 mm standard).
- Use an arm that can support a weight of at least 13 kg (28.66 lbs).

To attach the display to an arm stand:

1. Put the display face down on a clean and soft surface. Be careful not to damage the panel screen.
2. Remove the tilt & swivel foot cover.
3. Remove the small screw (A) fixing the small plastic cover on top of the foot. Next, remove the small cover itself.

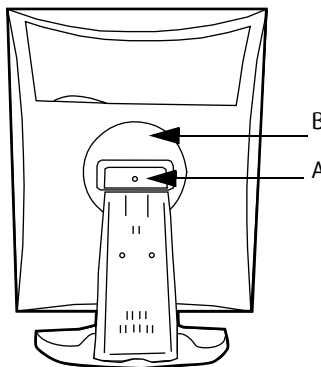
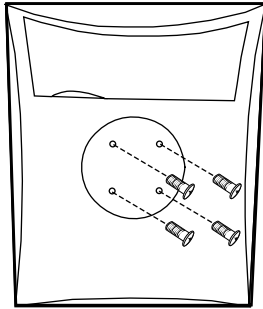


Figure 18: Display with tilt & swivel foot cover removed

4. Unscrew the 2 screws fixing the round plastic cover (B).
5. Lift up the round plastic cover.

6. Remove the four screws fixing the foot while supporting the foot.
7. Attach the arm stand **firmly** to the panel using 4 screws M4 x 8 mm.



4 screws M4 x 8mm

Figure 19

Installing the **Nio** drivers and software



Note: The installation dialog will display in English if your operating system's language is not supported.

This process applies to the following versions of Windows:

- Windows 2000 Professional,
- Windows XP Professional,
- Windows Professional x64 Edition,
- Windows Server 2003, and
- Windows Server 2003 x64 Edition.

Preparation

Prior to installing your BarcoMed Nio drivers and software you should do the following:

1. Install the BarcoMed Nio display controller(s) in your system.
2. Connect the BarcoMed Nio display panel(s) to the BarcoMed Nio display controller(s) and power supply(s).
3. Decide if you want to install the NioWatch Software in addition to the driver.
4. &Decide if you are going to install the **Nio** driver with DualView enabled or disabled.
 - When DualView is enabled a dual headed display controller displays two separate desktops, one for each display.
 - When DualView is disabled a dual headed display controller displays a single virtual desktop that spans across both displays.
5. Decide which Palette Mode you wish to use with the BarcoMed Nio display controller. If you are uncertain, use the default setting as this setting can be changed later using the BarcoMed Driver Tab of the Windows Display Properties control panel.
6. Put the **Nio** ZMP display panel in **landscape** position before installing the software.

Put the **Nio** 3MP/5MP display panel in **portrait** position before installing the software.

If you wish to change the panel orientation later, the image orientation will adapt automatically to the panel orientation **after rebooting the PC**.



Note: Both displays connected to a single display controller must have the same physical orientation and resolution in order to be attached to the Windows desktop.

Driver and software installation

To install your **Nio** Windows display controller driver and NioWatch Software for the first time follow the steps below.

If you are reinstalling the drivers or installing a new driver release over an existing driver release you may skip steps 2 and 3 below:



Boot your system, and log in using an account with administrator privileges.

2. When the *Found New Hardware Wizard* comes up, click Cancel. When the *System Settings Change* window asks you to restart your computer, click **"No"**.
3. Run the Barco Product Installation Wizard.

The Barco Product Installation Wizard should start automatically if you insert the BARCO NioDisplay System Installation CD-ROM into your CD drive *after* the operating system has started. If your CD drive's auto-run is not enabled or the Barco Product Installation Wizard does not start automatically, you can run the Barco Product Installation Wizard manually by following these steps:

- a) Click the **"Start"** button in the task bar.
- b) Click **"Run"**.
- c) Click **"Browse"** and browse to the root directory of the BARCO NioDisplay System Installation CD-ROM and click on the file, **"Setup.exe"**, and click **"Open"**.
- d) Click **"OK"**.

or

- a) Browse to the root directory of the Barco NioDisplay System Installation CD-ROM and double click on the file, **"Setup.exe"**.

4. Click **"Next"** on the Welcome page.
5. Click **"Next"** on the Components to be installed page.
6. Follow the wizard's on-screen instructions to complete the installation.



Note: When the wizard page shown in figure 20 appears you may either click **"Next"** to accept the default settings or if you know the settings required for your viewing application, you may select them now and then click **"Next"**. You may change these settings later by using the Barco pages of the *Windows Display Control Panel*.



Figure 20

Please refer to your application manuals for information on the correct Palette and Drawing modes to select.

7. When the driver setup is complete, click the **Finish** button.

The Barco Product Installation Wizard will now guide you through the installation of NioWatch and BarcoMed SelfExam.

8. When the Setup complete message appears, select **Reboot System Now** and click **Finish**.

Automated display configuration

Once the drivers, software and documentation have been installed and your system has been rebooted, the *Barco Monitor Plug and Play Software* should automatically detect your Barco displays and attach them to the desktop with the correct resolution. If the *Barco Monitor Plug and Play Software* fails to detect your Barco displays or fails to attach them to the desktop correctly please refer to the section, **“Setting the resolution of your Nio display”** on page 105 in the Troubleshooting section of this manual.

Reinstalling drivers

You can install new drivers or reinstall existing drivers at any time by using the Barco Set-up wizard on your BARCO NioDisplay System Installation CD-ROM, see **Installing the Nio drivers and software** on page 46 of this manual.

Uninstalling the drivers and software

To uninstall the Barco drivers, or software for your **Nio** Display Systems, please use the *Windows Add/Remove Programs* utility. This utility can be found in the Windows Control Panel.

NioWatch

BarcoMed NioWatch installation

1. Click **"Next"** on the Welcome Screen of the BARCO NioWatch InstallShield Wizard (figure figure 21 on page 50) to begin the installation or click **"Cancel"** to cancel and return to the BarcoMed Product Install Wizard.
2. After reading the Software License Agreement on the next screen, click **"Yes"** to continue.
3. Click **"Next"** on the Choose Destination Location screen to install the **NioWatch** software in the default location. Or click **"Browse"** to install the software in a different location.

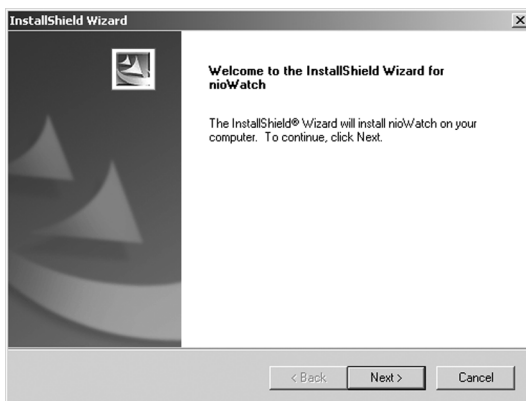


Figure 21

4. Click **"Next"** on the Select Program Folder screen to install the **NioWatch** software in the default location. Or select one of the folders in the Existing Folders dialog window.

While the wizard is installing NioWatch, it will display a Setup Status screen.

5. When the Wizard has finished installing the NioWatch software it will ask you if you want to read the Release Notes now. Click **"Yes"** or **"No"** to continue.
6. When the InstallShield Wizard Complete Screen appears click **"Finish"**.
7. Click **"Finish"** on the BarcoMed Product Installation screen to complete the install process.



Note: Silent mode installation

You can install NioWatch in silent mode on a system where no previous version of NioWatch is installed.

Silent mode means that no user intervention is required during installation.

To install NioWatch in silent mode:

1. Open the command prompt (DOS window) in Windows.
2. Using DOS commands, navigate to the folder containing the NioWatch setup.exe file on the CD-ROM.
3. Type: "setup.exe _/s_/v/qn" (where " _" represents a space)

Barco LCD sensor installation

In case you will be using the Barco LCD sensor with your system, you may have to install its driver.

The Barco LCD sensor is a USB device. Connect the sensor to a free USB downstream connector.

When you connect the sensor for the first time, the "New hardware found" wizard starts.

In that case, locate the appropriate driver file (.inf file) on the NioWatch CD-ROM in the folder "BarcoLCDSensor".

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Display Controller settings

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BarcoMed Driver Tab

Introduction

After the BarcoMed Windows display controller driver is installed, a new Display Properties tab is available for configuring special features of the BarcoMed display controller.

Languages supported

The BarcoMed Driver Tab supports the following languages:

- English (U.S) (default)
- Dutch
- French
- German
- Italian
- Japanese
- Korean
- Simplified Chinese
- Traditional Chinese

To change between the languages select the correct region via the Regional Settings Control Panel in your machine's Start > Settings > Control Panel.

Using the BarcoMed Driver Tab



Please note that you must have logged on to Windows using an account with administrator privileges in order to use the BarcoMed Tabs of the Windows Display Control Panel to change any display settings.

1. Open the "Display Properties Control Panel" by right clicking on the desktop, then select "**Properties**".
2. Under Windows 2000 or Windows XP, click on "**Settings**" tab. Double click on the rectangle that represents the Barco display whose settings you wish to change to bring up its property page. Click on the "BarcoMed Driver" tab (see figure 22).

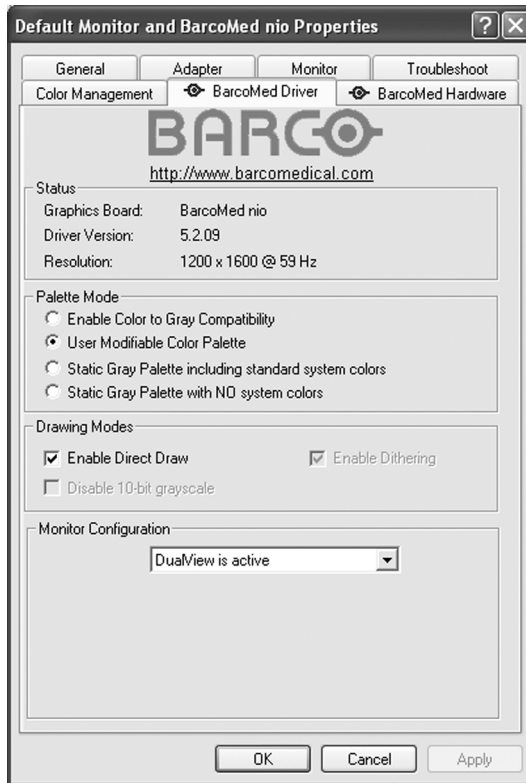


Figure 22: BarcoMed Driver Tab

Status

The Status section displays information about the current BarcoMed display controller, driver, and the currently selected display resolution.

Graphics Board

This displays the current BarcoMed display controller.

Driver Version

This displays the current BarcoMed driver version.

Resolution

This displays the currently selected display resolution.

Palette Mode

In the Palette Mode section you can choose one of the four following Palette Modes. If you are using a color display in conjunction with your Barco grayscale display(s) under Windows 2000 or Windows XP, prior to selecting a palette mode please make certain that you have configured your Windows 2000 or Windows XP desktop correctly. (See the section **“Setting the resolution of your Nio display”** on page 105.)

Color to Gray Compatibility

Use this palette option for applications, such as Java, which require True Color support. Such applications may not work correctly when using one of Barco's three “Standard 8-bit (256-color)” palette modes. All applications that are designed to work correctly with 8-bit (256-color) modes should continue to work normally.

Please note that dithering is not used while in this mode. The Enable Dithering check box will be grayed-out, and dithering will be automatically disabled regardless of whether this check box is checked. This complies with the Windows standard interface method.

Also, please note that direct access to the hardware through DirectDraw is not allowed in this mode. The Enable DirectDraw check box will be grayed-out, and DirectDraw's access to the hardware will be automatically disabled regardless of whether this check box is checked. DirectDraw is still usable through DirectDraw's Hardware Emulation Layer.

UserModifiable Color Palette

This option allows applications to modify the palette contents dynamically. As indicated in figure 23, this mode reserves the first 10 and last 10 entries in the palette for the Windows operating system, but applications can manipulate the middle 236 entries. This is the standard palette mode as configured by Windows.

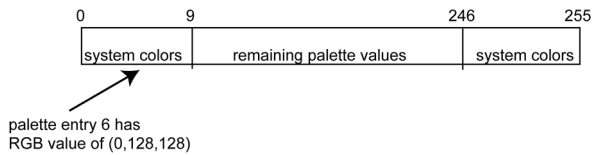


Figure 23

Static Gray Palette including standard system colors

This option sets the palette to be a static set of 256 gray values. Therefore, applications are denied the ability to dynamically change or allocate palette entries. This prevents palette conflicts between applications, which can cause image color values to appear distorted in the background application.

As shown in figure 24, the 20 standard system colors are converted from RGB to gray values. The rest of the 236 entries from index 10 to 245 contain the missing gray values so that the palette has the full 256 gray values within it.

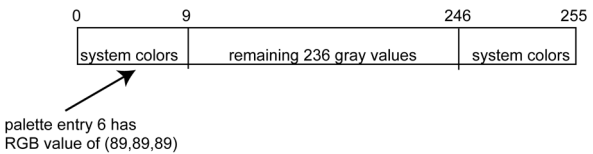


Figure 24

Please note that dithering is not permitted while in this mode. The Enable Dithering check box will be grayed-out, and dithering will be automatically disabled regardless of whether this check box is checked. This complies with the Windows standard interface method. If you are unsure whether or not your application requires this “Static Gray Palette including Standard System Colors” mode, contact your application provider.

Static Gray Palette with NO system colors

This option sets the palette to be a static linear ramp of 256 shades of gray. Therefore, applications are denied the ability to dynamically change or allocate palette entries. This prevents palette conflicts

between applications, which can cause image color values to appear distorted in the background application.

As shown in figure 24, each of the 256 entries in the palette has an RGB value of (i, i, i) where i is the index from 0 to 255.

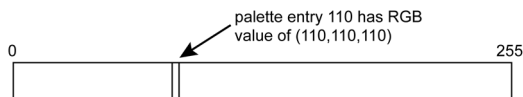


Figure 25

If you wish to use a static gray palette we recommend using the “Static Gray Palette including Standard System Colors” option instead of this one. This is due to the fact that some applications assume that the first and last 10 entries of the palette are the standard system colors. In this palette mode, these entries are made up from entries in the bottom or the top of the gray ramp. Please note that dithering is not permitted while in this mode. The Enable Dithering check box will be grayed-out, and dithering will be automatically disabled regardless of whether this check box is checked. This complies with the Windows standard interface method. If you are unsure whether or not your application requires this “Static Gray Palette with NO System colors” mode, contact your application provider.

Drawing Modes

In the Drawing Mode section you can choose from the following Drawing Modes. If any of the options in this section are grayed out, then they are not available for the model controller with which you are working.

Enable DirectDraw

This option allows the user to enable or disable DirectDraw. DirectDraw is a software interface that provides direct access to display devices while maintaining compatibility with the Windows graphics device interface (GDI). DirectDraw provides a device-independent way for applications to gain access to the hardware features of specific display

devices. If you enable DirectDraw, your application will have the choice of using DirectDraw or GDI. If you disable DirectDraw, your application will use GDI instead of DirectDraw. Please note that in any case, your application can always use BarcoMed driver functions (i.e. WinBarco) or other graphics extensions (such as OpenGL). DirectDraw is enabled by default.

Enable Dithering

This option allows the user to enable or disable dithering. Dithering is a technique for increasing the perceived range of colors in an image at the cost of spatial resolution. Adjacent pixels are assigned differing color values; when viewed from a distance, these colors seem to blend into a single intermediate color. The technique is similar to the half-toning used in black-and-white publications to achieve shades of gray. Please note that this option is only available when the User Modifiable Palette Mode is selected. This is because dithering is only supported under Windows when the display is palletized. If either the “Static Gray Palette including Standard System Colors” mode or the “Static Gray Palette with NO System colors” mode is selected, the “Enable Dithering” check box will be grayed-out, and dithering will be automatically disabled regardless of whether this check box is checked. This complies with the Windows standard interface method.

Monitor Configuration

Note: If the options in this section are grayed out, then they are not available for the model controller with which you are working.

BarcoMed Hardware Tab

Introduction

The BarcoMed Hardware Tab is used for gathering information about BarcoMed display controller(s). For all BarcoMed display controller(s) it will display PCI information. For BarcoMed display controller(s) based on the AURA video chipset it will also display information about the Firmware installed on the board.

Table 1:

AURA Controllers	Non-AURA Controllers	BarcoMed Hardware Tab Support
BarcoMed Nio		PCI and Firmware Information
BarcoMed Coronis		PCI and Firmware Information
BarcoMed 1MP2FH		PCI and Firmware Information
	BarcoMed 2MP1	PCI Information Only
	BarcoMed 2MP1NT	PCI Information Only
	BarcoMed 2MP2	PCI Information Only
BarcoMed 2MP2H		PCI and Firmware Information
	BarcoMed 2MP2CF-3D	PC and Firmware Information
	BarcoMed 2MP2CP	PCI and Firmware Information
BarcoMed 2MP2FH		PCI and Firmware Information

Table 1:

AURA Controllers	Non-AURA Controllers	BarcoMed Hardware Tab Support
BarcoMed 3MP2FH		PCI and Firmware Information
	BarcoMed 5MP1H	PCI Information Only
BarcoMed 5MP1HM		PCI and Firmware Information
	BarcoMed 5MP2	PCI Information Only
BarcoMed 5MP2 AURA		PCI and Firmware Information
BarcoMed Coronis 5MP		PCI and Firmware Information
BarcoMed 5MP2F		PCI and Firmware Information
BarcoMed 5MP2FH		PCI and Firmware Information

Using The BarcoMed Hardware Tab

To access the BarcoMed Hardware Tab do the following:

1. Open the “Display Properties Control Panel” by right clicking on the **desktop**, then select **“Properties”**.



Figure 26 BarcoMed Hardware Tab under Windows 2000 or Windows XP

Device

Displays the current BarcoMed display controller, driver, and the currently selected display resolution.

Identify Device: This button is for BarcoView Medical Imaging Systems (MIS) internal use only and is grayed out.

PCI Information

Device ID: Displays the device's PCI Device ID number.

Vendor ID: Displays the device manufacturer's PCI Vendor ID number.

Subsystem ID: Displays the device's PCI Subsystem ID number.

SubsystemVendorID: Displays the device's PCI Subsystem Vendor ID number.

VGA Status: Displays whether the VGA capabilities of the BarcoMed controller are enabled or disabled.

Firmware Information

Product Name: Displays the name of the BarcoMed display controller installed in the selected PCI slot.

Serial Number: Displays the serial number of the BarcoMed display controller installed in the selected PCI slot.

VGA Bios Version: Displays the VGA Bios version for the BarcoMed display controller installed in the selected PCI slot.

Firmware Version: Displays the firmware version for the BarcoMed display controller installed in the selected PCI slot.

Hardware Version: Displays the Hardware Version for the BarcoMed display controller installed in the selected PCI slot.

"Advanced ..." Button: By clicking on this button, the user can display more information about the BarcoMed display controller installed in the selected PCI slot.

Utilities

"Generate Report" Button:

Clicking this button will launch the BarcoMed Self Exam utility. BarcoMed Self Exam is an automated Barco Diagnostic Tool that is used to gather the information that support engineers and technicians need to help determine the root cause of a customer problem. It probes the system for various types of system information, and saves it to a web-page report that can then be analyzed by the Barco ImageCare team.

BarcoMed Self Exam is implemented in a Wizard Format. The BarcoMed Self Exam Wizard will first ask the user to provide detailed customer contact information. After completion of the customer contact

information screen, the Wizard will then ask the user to provide a description of the problem, and prompt the user to enter the Medical Viewing Applications that they are using. The Wizard will then automatically collect the diagnostic information from the user's system. When completed, the Wizard will alert the user of completion and open the report. The report is saved in html format in one of two locations:

English Version of Windows®

Report will be on the desktop

Non-English Version of Windows®

Report will be in the user's directory in a folder named "desktop".

Languages Supported

BarcoMed Self Exam is currently available to run in English, German, Dutch, Japanese¹ and Simplified Chinese¹. The application will detect the regional settings on the user's machine and switch languages accordingly. The default language is English.

Welcome Screen

The Welcome screen reminds the user to close all applications before starting the wizard. The screens that follow guide the user through gathering pertinent diagnostic data that will help in determining the root of the problem.

Customer Information Screen

All fields on this screen **must** be filled in. This screen asks the user for contact information that will help the Barco support team contact the customer. The user will not be allowed to move forward to the next screen unless all of the fields are filled in.

-
1. Japanese and Simplified Chinese language support requires that both the Locale and Default System Locale need to be set to Japanese with the Japanese language pack installed. These are set in the Regional Options tool of the Windows Control Panel.

Customer Diagnostic Questions Screen

This screen allows the user to tell the Barco ImageCare team as much as possible about the problem. For the Medical Viewing Applications Running field, enter the medical applications that are currently running on the system with the problem. For the “Any Applications using DIMPL” question, select the **“radio button”** that applies to the correct response. For the “Detailed Description” field, **enter a detailed description of the problem**. And, for the Additional Notes field, enter any information that could help the Barco ImageCare team diagnose the problem.

Gathering Diagnostic Data Screen



Important: When performing the Graphics Operations, you must drag the **"Gathering Diagnostic Data Screen"** onto the display for which you want the Graphics Operations data.

This screen gathers the diagnostic data from the user's system as described above in this document. Click the **“Start Diagnostic”** button to begin the diagnostic gathering process.

To perform the graphics operations test, check the graphics operations checkbox. During the graphics operations test, several things will happen to the screen. Each graphics operation is performed for 10 seconds. To quit the graphics operations test at any time, press the Escape button.

To create a summary report for QA purposes, check the summary report checkbox. If this box is checked, an additional report will be saved on the desktop called BarcoExamSummary.txt.

Please let the wizard gather all of the data, the **“NEXT”** button will be enabled only after all of the information is gathered. Once the information is gathered, the user may **not** go back in the wizard screens.

Completion Screen

The BarcoMed Self Exam has collected all of the information. A report called BarcoSelfExam.html with all of the diagnostic data that was

collected is created. If a summary report was created, it is called BarcoExamSummary.txt. The reports are saved in one of two locations:

English Version of Windows®

Report will be on the desktop

Non-English Version of Windows®

Report will be in the user's directory in a folder named "desktop".



Note: The absolute path to the location of the BarcoMed Self Exam reports is:

under Windows 2000 and Windows XP

C:\Documents and Settings\<username>\Desktop

Submitting the Data to Barco Support

Once BarcoMed Self Exam has collected the data, the user can submit it to ImageCare, Barco Medical Imaging Systems' customer support organization by email. To do this you need a system with access to the World Wide Web.

1. Enter the following address in your Web browser's address bar:
<http://www.barco.com/medical/>
2. In the left hand column click on **"Contact us"**
3. Then click on **"Support"** in the drop down menu.
4. Find the appropriate ImageCare Center for your country and click on the **email link**.
5. Enter a **subject and a brief message** describing the problem about which you are requesting help.
6. Attach the **BarcoMed Self Exam report(s)** to the email message and send it.

You will receive an acknowledgment of receipt of your email by the end of the next business day.

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MeDis

ImageTile

MammoMeDis

MeDis upgrade kit

Display Controllers

LCD (digital) boards

CRT (analog) boards

Projection Systems

QA Software

MedCal Software

NioWatch

Plugins

Accessories

Modality OEM solutions

Support

E-Helpdesk & FAQ

RMA Request

Application Notes

Driver Information

Manuals

Contact us

Sales

Support

Partnerzone

Contact Us - Support Centres

Americas

BarcoView LLC

email: Image.careus@barco.com

3059 Premiere Pkwy, Duluth, GA 30097

Tel: 1-678-475-8262

Fax: 1-678-475-8237

Europe

BarcoView

email: Image.care@barco.com

Th. sevenlaan 106, B-8500 Kortrijk

Tel: +32 (0)56 233 376

Fax: +32 (0)56 233 460

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TOYO Corporation - Japan

email: Image.careJapan@barco.com

1 - 6, Yaezu 1-Chome, Chuo-ku

Tokyo 103-8284, Japan

Tel: +81 (0)3 3279 0771

Fax: +81 (0)3 3271 4757

Web: <http://www.toyo.co.jp/graphic>

Barco Ltd - Other Asian countries

email: Image.careasia@barco.com

17th floor, Kuohwa Building,

868-6, Chungcheng Road,

Chunggho City, Taipei County,

235, Taiwan

Tel: +886-2-8221-6868

Fax: +886-2-8221-6969

Australia & New Zealand

Barco Systems - Australia

email: Image.careau@barco.com

2 Rocklea drive,

Port Melbourne, VIC 3207, Australia

Tel: +61 3 9646 5933

Fax: +61 3 9646 5887

If you have comments about our web site, please send an e-mail to webmaster@barco.com.

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About Barco

Update Device... Button:

Clicking this button will launch the BarcoMed Hardware Configuration utility. This program allows the user to flash update the firmware stored in the ROM of the currently selected BarcoMed display controller. The BarcoMed Hardware Configuration utility is implemented in a Wizard

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Nio MKII

format, which guides the user through the flash update procedure. The user will be prompted to select a firmware update file to use for the update process. This file will be provided by BarcoView MIS if and when a firmware update is required.

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NioWatch operation

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To use NioWatch

The NioWatch application resides in the Windows systray. To use one of the NioWatch functions, right-click on the NioWatch systray icon and select the appropriate option:

- Display settings: Allows to view information about your display(s) and display controller. Also allows to select a display function, control display luminance and calibrate display(s)
- Test patterns: Allows to select test patterns to show
- Application settings: Allows to change NioWatch application settings, such as the Equalization option for calibration or MediCal Administrator connection
- Help: Allows to consult the online help
- About: Allows to view information about this version of NioWatch
- Exit: Allows to close NioWatch and remove it from the systray



Figure 27: NioWatch systray icon



Note: After installation, a shortcut “NioWatch Client” is installed in the Nio-Watch installation directory. You can copy this shortcut to another location (e.g., desktop) if desired.

After double-clicking this shortcut, the NioWatch console appears, allowing you to execute the NioWatch functions.

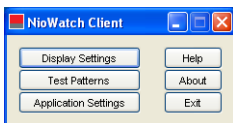


Figure 28: NioWatch console

Display settings

General

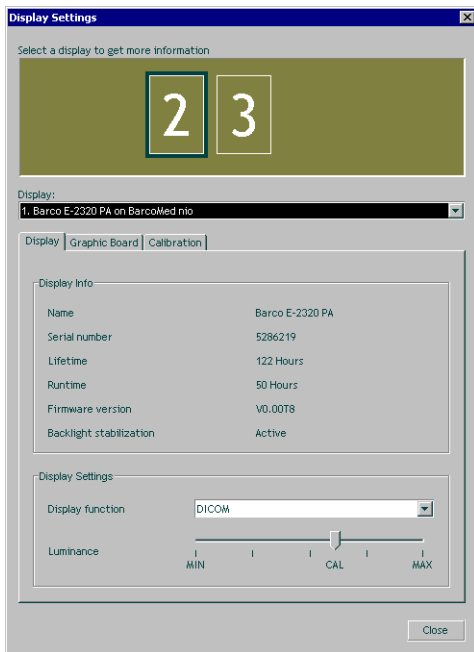


Figure 29: Display Settings dialog

The numbered icons in the upper part of the dialog represent the display controller heads supported by NioWatch.

The display controller heads are also listed in the **Display** drop-down box.

If you wish to control a display in a multi-head system, you must select the display controller head to which the display is connected. You can do this by clicking on the corresponding numbered icon or by selecting the corresponding display controller head from the **Display** drop-down box.



Tip: If you click on a numbered icon, the corresponding number appears for a few seconds on the display connected to that display

controller head. In that way you can easily see which display is connected to which head.

The Display tab allows to view information about the display.

The Graphic Board tab allows to view information about the display controller.

The Calibration tab allows to calibrate the display(s) or view the result of the last calibration.

Display tab

- In the **Display Info** section, you can view the name and serial number of the selected display.

For Nio (E-XX20) displays, you can also view:

- Lifetime: Operation time including time in stand-by
 - Runtime: Operation time excluding time in stand-by
 - Firmware version: Version of internal display software
 - Backlight Stabilization: Status of the backlight stabilization in the display.
- To select another display function, select an item from the **Display Function** drop-down box.

If the selected display has been calibrated to the selected display function in the past, the display will be set according to this calibration. If no former calibration was found, default factory settings are selected.

When you restart NioWatch, the last selected display function is automatically selected.

- To adjust display luminance manually, adjust the **Luminance** slider. This function is not available for MFCD/MFGD 1218 displays.

The luminance setting is saved when the system is shut down.

If the slider is positioned above the CAL mark, the luminance is in calibrated position, as determined during the latest calibration. If

the slider is not above the CAL mark, the luminance is not in calibrated position.



Important

If you want the system to be DICOM compliant, you must select the DICOM display function and calibrate the display. After calibration, the luminance must remain in calibrated position to maintain DICOM compliance.

Graphic Board tab

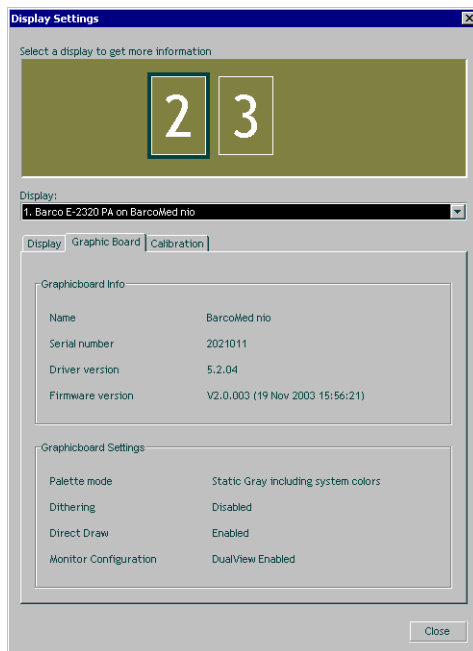


Figure 30: Graphic Board tab

Here you can see information about the installed display controller: Name, serial number, driver version and firmware version.

Calibration tab

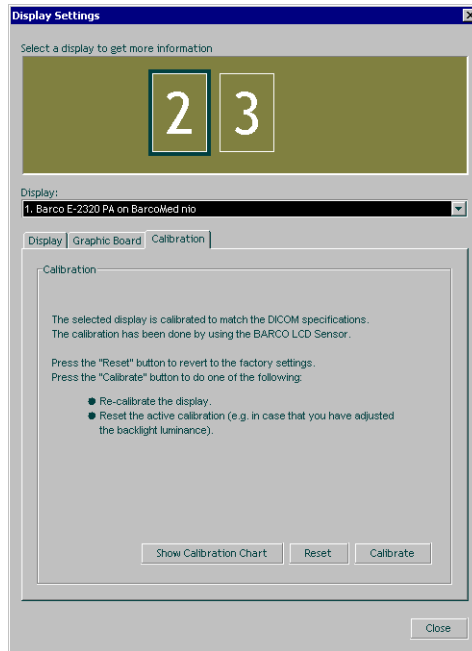


Figure 31: Calibration tab

Here you can calibrate display(s), revert to the latest calibration, revert to default factory settings and view the result of the latest calibration. The possible options are explained below.

To calibrate the display using the Barco LCD sensor:

1. If you have multiple displays of the same type connected (multi-head system), consider if you wish to **equalize** the display you calibrate to a reference display.



Equalization means the luminance of the display you are calibrating will be matched to the luminance of the reference display.

If you wish to equalize the display, you must close the Display Settings dialog and make sure the **Equalization** option in the

Application Settings dialog is set. See “Calibration tab” in the description of the Application Settings dialog.

2. If you have multiple displays connected (multi-head system), select the display you wish to calibrate by clicking on the corresponding numbered icon in the Display Settings dialog.
3. Click the **Calibrate** button.
4. A message appears, showing the different calibration options.

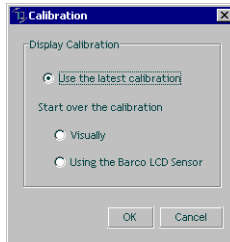


Figure 32: Calibration choices

5. Select “Using the BARCO LCD sensor” and click **OK**.

This option is grayed in case NioWatch does not find a connected Barco LCD sensor.

6. Follow the guidelines on the screen to complete the calibration successfully.



Note:

If the Equalization option is set in the Application Settings and NioWatch finds at least one other display of the same type that is calibrated, the “Match with reference” page appears during the calibration process.

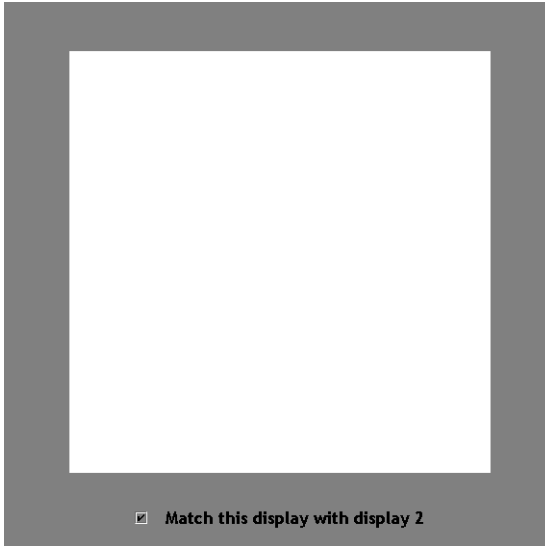


Figure 33: Match with reference

To equalize the display, check the option “Match this display with display...” and click **Next**. The display number that appears in this option, refers to the reference display.

Manual calibration

1. Follow step 2 and 3 of the calibration with Barco LCD sensor (see page 77).
2. In the Calibration dialog (see step no. 4. in the description of the calibration with sensor), check the option **Visually** and click the **OK** button.

The DICOM Optimizer dialog appears.

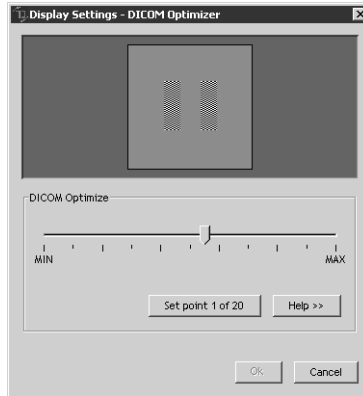


Figure 34: DICOM Optimizer dialog

3. Adjust the slider until there is almost no visible difference between the background of the image above the slider and the bitmap inside this image.
4. When done, click button **Set point 1 of 20**.
5. Repeat this procedure until the button is grayed. This indicates the last point is set.
6. Click **OK** to finish.

To reset to the latest calibration:

1. Follow step 2 and 3 of the calibration with Barco LCD sensor (see page 77).
2. In the Calibration dialog (see step no. 4. in the description of the calibration with sensor), check the option **Use the latest calibration**.
3. Click the **OK** button.

The calibration and the luminance will be reset to the latest calibrated position.



Note:

When you start up the system, the calibration is also reset to the latest calibrated position. The luminance, however, is kept at the latest value.

To view a graph showing the result of the latest calibration:

1. In the Calibration tab dialog, click on **Show calibration chart**.
This button is available only if the display has been calibrated with a sensor before.
2. A graph is shown displaying the latest calibration compared to the theoretical display function.

To revert to the default factory settings:

1. In the Calibration tab dialog, click on **Reset**.
2. As a result, the settings are restored to the default factory values.

Test patterns

Test Patterns

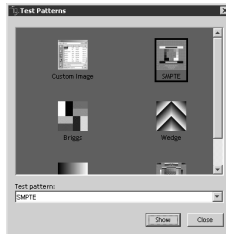


Figure 35: Test Patterns dialog

1. Select the desired test pattern by clicking on the corresponding thumbnail or selecting a pattern by name from the Test pattern drop-down box.
2. Click **Show** to display the pattern.
If you have selected **Custom Image**, you can select a bitmap image (e.g., saved on the hard disk) as test pattern.
3. To hide the test pattern again, click inside the pattern.

Application settings

Calibration tab

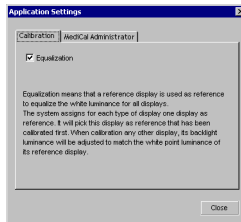


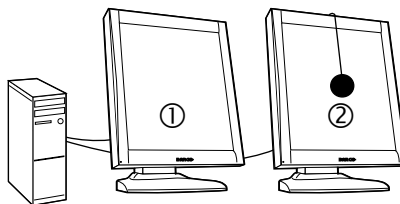
Figure 36: Calibration tab

Here you can check the Equalization option, allowing you to match all the displays from a multi-head system to the luminance of the first calibrated display of the system.



Suppose you work with a system containing 2 displays of the same type, and you wish display (2) to have the same output luminance as display (1). Therefore first calibrate display (1). Next, calibrate display (2) while the Equalization option is checked.

The first calibrated display in the system is the reference display.



- (1) Reference display
- (2) Calibrated display: Luminance automatically matched to reference display

Figure 37: Dual-head equalization

The Equalization option will be available only if:

- the system contains at least one display of the same type as the one being calibrated

- at least one of the displays of the same type has already been calibrated before using a sensor.

To equalize the displays:

1. Be sure the reference display is calibrated to the desired luminance.
2. Set the Equalization option in the Application Settings dialog.
3. Close the Application Settings dialog.
4. Open the Display Settings dialog and calibrate display (2).

The display will be calibrated and additionally the display luminance will be matched to the luminance of the reference display (1).

MediCal Administrator tab

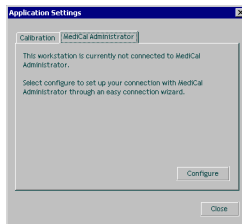


Figure 38: MediCal Administrator tab

Here you can connect to MediCal Administrator, if present.

To connect to MediCal Administrator, click the **MediCal Administrator** button. As a result, the MediCal Administrator connection wizard starts. Please follow the guidelines from the wizard.



The MediCal Administrator software is a hospital-based softcopy image quality management system that keeps the consistency data of every connected display system in a central database. Via

the user-friendly web interface, accessible from any client, users have access to all the information of the installed display base.

For more information about MediCal Administrator, please contact Barco Medical Imaging Systems or consult our web site.

Update NioWatch

In the Windows Start menu, the Update NioWatch application is installed during installation of NioWatch.

To update NioWatch:

Select **Update NioWatch** from the Start > Programs > Barco NioWatch menu.

The application will search via the Internet if NioWatch updates are available. If so, you will get the option to install them.

Display operation

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Display operation

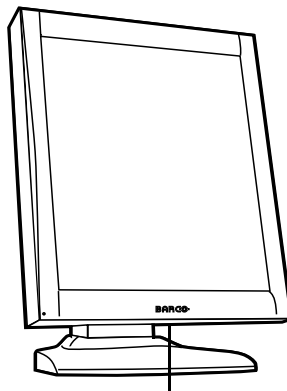
Operating precautions

Continuous operation of the display with the same image may result in some image sticking on the LCD panel. Over 10 hours operation with the same image content is not recommended.

Switching on DPMS on display and PC and activating a good screen saver may decrease the risk of image sticking (image retention).

Stand-by switching

When the display is on and no on-screen display is visible, push and hold the control wheel at the front for a few seconds to switch the display in stand-by. The LED turns orange.



Push and hold

Figure 39

When the display is in stand-by, press the control wheel to switch it back on.

About the On-Screen Display (OSD)

About the on-screen display

The on-screen display (OSD) has a hierarchical tree structure, with several levels. The top level is the “Main Menu”.

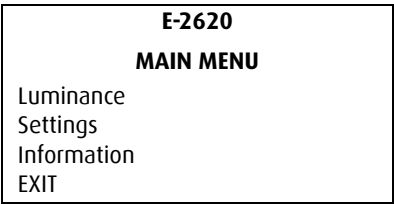


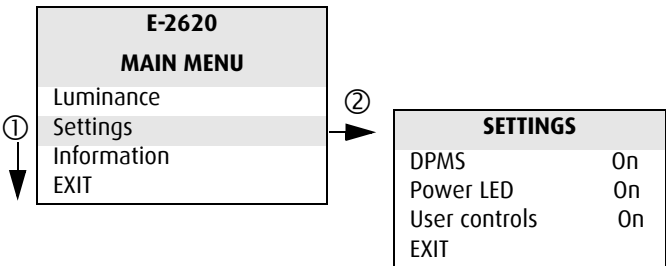
Figure 40: Main menu

How to navigate through the OSD

1. When the OSD is not on the screen, rotate the control wheel to display the OSD.

The main menu appears.

2. To enter into a menu: First, rotate the control wheel to select the desired menu. Next, press the wheel shortly.



1. Rotate the control wheel
2. Press the control wheel

Figure 41: OSD menu navigation

- 3. To exit from a menu, rotate the control wheel to select EXIT.
If you exit from the Main Menu, you exit the OSD.
- 4. To change an adjustment value (e.g., the luminance value), rotate the control wheel to select the adjustment and press the wheel shortly.

The adjustment name appears, as well as the current adjustment value. Rotate the wheel to change the value.

When done, press the wheel shortly to confirm the change and return to the menu.
- 5. To select a value from a predefined list (e.g., in Settings), rotate the control wheel to select the setting and press the control wheel until the desired value appears.

Locking and unlocking user controls

The User Controls function allows to disable or enable the control wheel functions.

When user controls are disabled, you cannot:

- display and use the on-screen display
- switch the display in stand-by mode

To disable user controls:

- 1. Rotate the control wheel to display the on-screen display. The Main Menu appears.
- 2. Rotate the control wheel to select **Settings**.
- 3. Press the control wheel to enter the Settings menu.

SETTINGS	
DPMS	On
Power LED	On
User Controls	On
EXIT	

Figure 42: Settings menu

4. Rotate the control wheel to select **User Controls**.
5. Press the control wheel to switch from "On" to "Off".
6. Exit the menus.

To enable user controls:

1. Do not use the control wheel for at least 3 seconds.
2. Rotate the control wheel 1 step clockwise.
3. Press the control wheel 2 times.
4. Rotate the control wheel 1 step counterclockwise. The on-screen display appears.

Note: Steps 2 to 4 must be performed in maximum 3 seconds.

5. Rotate the control wheel to select **Settings**.
6. Press the control wheel to enter the Settings menu.

SETTINGS	
DPMS	On
Power LED	On
User Controls	Off
EXIT	

Figure 43: Settings menu

7. Rotate the control wheel to select **User Controls**.
8. Press the control wheel to switch from "Off" to "On".
9. Exit the menus.

Complete OSD overview

Main menu

Name	Description
Luminance	Adjust the target luminance to which the display will be stabilized.
Settings	Change settings for DPMS, Power LED and User Controls
Information	Read information about the display

Luminance

Name	Description
Luminance Target	Manually adjust the luminance. The luminance is indicated in %.

Luminance adjusts the overall luminance (light output) of the *display*. It does not affect the grayscales of the image on the screen.

Settings

Name	Description
DPMS	Switch on/off the automatic power saving system (DPMS)
Power LED	Switch the power LED on/off. Note: The LED's orange DPMS state is not influenced by this setting. So, when the display goes into power-saving mode, the LED will turn orange, even if it was switched off by this setting.
User Controls	Disable the control wheel functions

Information

Name	Description
Product	The display type
Serial No	Indicates the display serial number
SW Version	Displays the current internal software version
Display Lifetime	Indicates the total time the display has been operating, including the time in stand-by
Backlight Lifetime	Indicates the total time the display has been operating, excluding the time in stand-by

Cleaning

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Precautions



Precautions

- Take care not to damage or scratch the glass or LCD panel.
- Do not apply pressure on the glass or LCD panel.
- Do not apply or spray liquid directly to the glass, panel or cabinet as excess liquid may cause damage to internal electronics. Instead, apply the liquid to the cleaning cloth.
- DO NOT USE:
 - Lye or cleaning solutions containing lye*
 - Acid
 - Detergents with fluoride
 - Detergents with ammonia
 - Detergents with abrasives
 - Steel wool
 - Sponge with abrasives
 - Cloth with thread made of steel
 - Other coarse tools

*(Lye is a strong caustic alkaline solution of potassium salts.)

Front filter (protective screen)

Remark: The protective screen is standard installed on E-2621 and E-3621 displays. It is optional for other Nio display models.

Cleaning instructions

- Clean the glass using a soft cotton cloth, lightly moistened with a watery solution or a mild commercial glass-cleaning product suited for coated glass surfaces.
- Wipe dry with a dry cloth.

LCD panel

To clean the LCD panel:

- Dust particles on the LCD panel may be blown away by using a dust remover. E.g., DUST OFF 67 (KONTAKT Chemie).

A dust remover is composed of a blend of compressed liquid gases functioning as propellant. They provide a jet of dry inert gas that acts like compressed air for a quick and safe removal of dust particles and other dry contaminants on the surface of the lcd panel or the glass panel.

Attention: The dust remover contains a liquid gas. If you shake the can or move the can too fast while spraying, you may blow drops of liquid on the panel surface!

If this is the case, clean the panel as described below.

- If the LCD panel is dirty or wet, clean the panel using a lint-free, nonabrasive cloth, lightly moistened with a solution of 25% Isopropyl Alcohol (IPA) and 75% de-ionized or distilled water. E.g.: Cleareen, a product of Certified Laboratories.
- Take another clean, dry, soft, lint-free cloth and gently wipe the glass dry.

Cabinet

Proceed as follows:

- Clean the cabinet using a soft cotton cloth, lightly moistened with a recognized cleaning product for medical equipment.
- Repeat with water only.
- Wipe dry with a dry cloth.
- The cabinet has been tested for resistance to the following products:

Cidex, Betadine, Alcohol (Isopropyl and Ethyl), Ammonia-based cleaners (Windex) and Aquasonic Gel.

Troubleshooting

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General tips

- If one display from a multi-head system exhibits problems, try to eliminate the problem by switching video cables or power supplies. In that way you can find out if the problem resides in the display or not.

Problems and solutions

Problem description	Possible tests or solutions
Screen remains black	<ul style="list-style-type: none">• Please check the installation procedure in this manual• If the LED at the front is orange, the display is in stand-by• Check in the Windows Display Properties if the display controller video heads are attached. If not, there will be no image on the screen.• The external power supply may be defective•
Image exhibits noise or interference	<ul style="list-style-type: none">• The video cable may be of poor quality• DVI video cable may not be firmly connected to the PC or to the display
Image contains missing pixels	<ul style="list-style-type: none">• A number of missing pixels may be normal (inherent in LCD technology)
Image contains not enough greyscales	<ul style="list-style-type: none">• You may have installed the driver software with an inappropriate selection of Palette Settings (Static Gray with or without System Colors). Install the driver software again using a different setting for Palette Settings.
The PC does not start up	<ul style="list-style-type: none">• Check the CMOS settings in the PC BIOS• The display controller may not be firmly seated in the PCI / AGP connector

Problem description	Possible tests or solutions
No image during PC start-up	<ul style="list-style-type: none"> Check the CMOS settings in the PC BIOS
Nothing happens when you press or rotate the control wheel	<ul style="list-style-type: none"> The User Controls may be disabled. Please read the paragraph about the “User Controls” function.
The image is non-proportionally spread out over the screen	<ul style="list-style-type: none"> Select another resolution in the Windows “Display Properties” control panel
The image on the screen is rotated 90°	<ul style="list-style-type: none"> Select another resolution in the Windows “Display Properties” control panel
The previous image remains slightly visible on the screen	<ul style="list-style-type: none"> This phenomenon, called “image sticking” is normal if the same image has been on the screen for a long time. The ghost image will disappear after some time. Over 10 hours operation with the same image content is not recommended. Switching on the display DPMS may decrease the risk of image sticking. A slight case of image sticking can be solved by continuously displaying a full white image during a number of hours.
On a dual-head system, the images on the left and right display seem to be switched	<ul style="list-style-type: none"> Switch the video cables at the display controller or at the display video inputs

Setting the resolution of your **Nio** display



Note: In order to set the resolution of your **Nio** you must be logged in using an account with administrator privileges.

1. Open the “*Windows Display Control Panel*” by one of the two methods below:

a) Start > Settings > Control Panel > Display

or

b) Open the “*Display Properties Control Panel*” by right clicking in an empty area on the desktop, then select “**Properties**”.

2. Click on the “**Settings**” tab.
3. Select the **rectangle** that represents the Barco Coronis display whose settings you wish to change.



Note: If you are using the VGA capabilities of your BarcoMed Nio display controller, the resolution for the first display may be set to a VGA resolution of “640 x 480” pixels with 16 colors and a default refresh rate. If your BarcoMed Nio controller is not running VGA, the display may not be enabled yet. To enable the display, check the “Extend my Windows desktop onto this monitor” **checkbox**, but do **NOT** click the “**Apply**” button at this time.

If you installed your BARCO NioDisplay System drivers in *SingleView* mode (default for Windows 2000) there will be one rectangle for the virtual display representing the two heads controlled by each BarcoMed Nio display controller.

If you installed your BARCO NioDisplay System drivers in *DualView* mode (default for Windows XP) there will be a rectangle representing each head controlled by each BarcoMed Nio display controller. This will be true even if you have only one display connected to your BarcoMed Nio controller. Both displays of a display controller cannot be enabled at the same time unless their display properties match. If necessary detach the second display of the BarcoMed Nio display controller you are working with by right clicking on the **rectangle** that represents it, deselect “**Attached**” and click the “**Apply**” button.



Note: Since Windows will not let you detach the primary display connected to a particular controller, you may need to temporarily make another display the primary display

4. For the display which is still attached click Click on the **"Advanced"** Button.
5. Select the **"Adapter"** tab and then click on the **"List All Modes"** button. Select the resolution and refresh rate that your **Nio** display supports from the dialog box and click **"OK"**.



Note: In the Adapter box, the Adapter string shows if this display is the First View or the Second View attached to the display controller. Please make a note of this, so that you can arrange the displays in the correct order later if necessary.

6. Click **"OK"** on the bottom of the Adapter Control Panel. If the **"OK"** button on the bottom of the Adapter Control Panel is not visible, press the **"TAB"** key once and then press **"CTRL"+"Enter"** to select **"OK"**.
7. Click **"OK"** in the "Windows will now apply your new desktop settings" dialog box. Your **Nio** display should now synchronize and display the Windows desktop.
8. Click **"Yes"** when asked, "Your desktop has been reconfigured. Do you want to keep these settings?"

To set the resolution of the second display attached to the BarcoMed display controller you are working with, go back to the "Settings" tab of the "Display Properties Control Panel". If necessary attach the second display you detached in step 2 above, by right clicking on the rectangle that represents it and selecting **"Attached"**.

Now repeat steps 5-8 above for this display.

If you are using a Quad-Head Configuration repeat all of the above steps for the two displays on the second display controller.



Note: If you have a single display configuration and you have enabled DualView, Windows will not allow you to attach the second head. This is normal and not a bug.

After enablingDualView and setting the resolutions in a Quad-Head Configuration you may need to drag the heads into the proper position in the window on the "Settings" tab, so that the

arrangement in the window on the “Settings” tab matches the physical arrangement of your configuration.

Driver re-installation, updates or removal

Reinstalling or updating your BarcoMed Nio driver



Note: These instructions apply to Windows 2000 and Windows XP.



Important for Windows 2000 or Windows XP users only: If you previously uninstalled the driver, do **not** allow the Windows Plug and Play software to reinstall the driver for you.

To reinstall or update only the BarcoMed Nio driver, follow the steps described in the section **“Using the BarcoMed Product Installation Wizard”** with the following changes.

1. Boot your system, and log in using an account with administrator privileges.
2. Insert your **Nio** Software CD into your computer’s CD drive. If the **“BarcoMed Product Installation Wizard”** doesn’t start within one minute, browse the contents of your **Nio** Software CD and double click on the file: **“Setup.exe”** to start the wizard.

The wizard will begin by displaying the screen shown in figure 44 below.

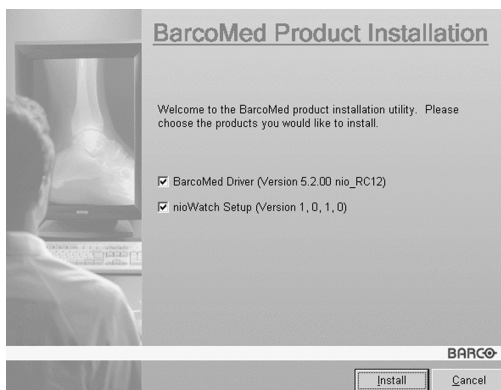


Figure 44

3. To update the driver, clear the checkbox next to **“NioWatch Setup”** (figure 45) and click **“Install”**.

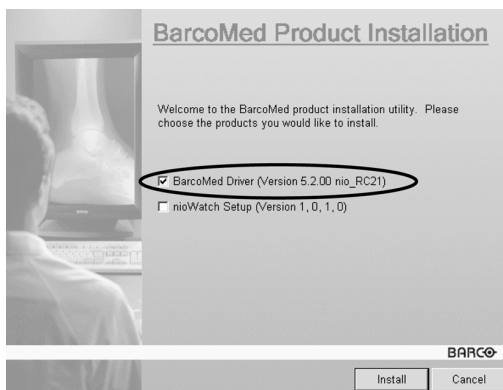


Figure 45

4. For **Windows 2000** or **Windows XP** please turn to Step 4 on page 46 in the section titled **“Installing the Nio drivers and software”** and follow the instructions to finish reinstalling or updating your BarcoMed Nio driver.

When the driver has finished installing, click **“Finish”**. Then click **“Finish”** again.

Reboot the system when prompted and then reset the resolution of your displays if necessary.

Uninstalling the BarcoMed Nio driver or Barco NioWatch software



Special Note: The BarcoMed Uninstaller is supported only on Windows 2000 and Windows XP.



To remove the BarcoMed Nio display controller driver from your system you must be logged in using an account with administrator privileges.

Uninstalling the BarcoMed Nio driver

1. Insert your BarcoMed Nio Software CD into your computer's CD drive. If the **“BarcoMed Product Installation Wizard”** doesn't

start within one minute, browse the contents of your **Nio** Software CD and double click on the file: **"Setup.exe"** to start the wizard.

2. The BarcoMed Product Installation Wizard will display its welcome screen.
3. Make certain that the checkbox next to the driver is checked and that all other checkboxes are unchecked (figure 46 below). Click **"Install"** to continue.

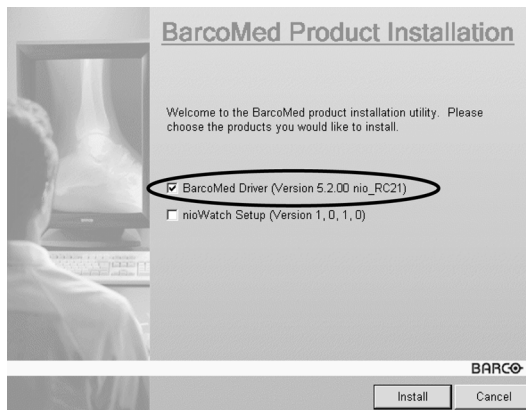


Figure 46

4. Click **"Next"**.
5. On the next screen (see figure 47 on page 112), **check** the checkbox next to "Uninstall this device" and click **"Next"** to continue.

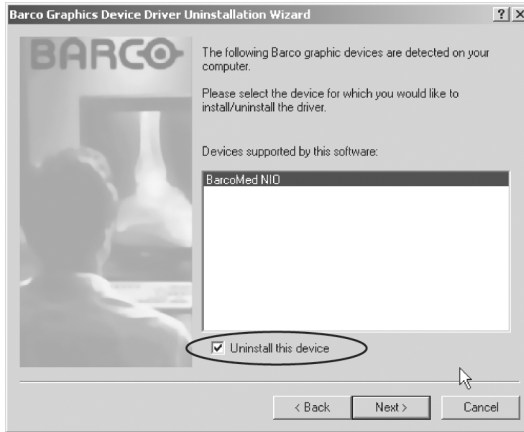


Figure 47

6. Click **"Next"**.
7. If you installed your driver with DualView enabled, skip to step 8.
If you installed your driver with DualView disabled, click **"Next"** to continue. Then click **"Finish"** to complete the uninstall process. Click **"Finish"** again to exit the wizard. Click **"Yes"** if Windows tells you that "you must restart your computer before the new setting will take effect".
8. If you have installed your driver in DualView mode the wizard will warn you that you must first disable DualView by rebooting and then run the uninstall program again.



Figure 48

Click **"OK"** to continue.

9. Click **"Reboot"** to disable DualView, click **"Finish"** to exit the wizard and then click **"Yes"** to reboot your system.



When your system restarts, log in again using an account with administrator privileges. DualView should now be disabled.

11. The **“BarcoMed Product Installation Wizard”** should automatically restart. Finish uninstalling the driver by clicking **“Next”** three times. Then click **“Reboot”**, **“Finish”** and **“Yes”**.

If the **“BarcoMed Product Installation Wizard”** doesn't automatically restart, finish uninstalling the driver by restarting the **“BarcoMed Product Installation Wizard”** by browsing the contents of your **Nio** Software CD and double clicking on the file: **“Setup.exe”**. Then follow Step 3 on page 111 through Step 7 on page 112 to finish uninstalling the driver.

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Technical Information

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Technical specifications

E- 2621:

Item	Specification
Picture panel	21.3-inch diagonal viewable screen TFT (thin film transistor) active matrix, gray-scale liquid crystal display
Resolution	Native: 1600 x 1200
Display area (H x V)	432.0 x 324.0 (mm)
Viewing angle (@ 10/1 contrast)	Vertical: 170° Horizontal: 170°
Pixel Pitch	0.27 mm (H) x 0.27 mm (V)
Native color resolution	8 bits / sub-pixel
Luminance	500 cd/m ² (calibrated)
Contrast ratio	700/1 (on/off in dark environment)
Response time	17.5 ms typical (@ 25° C after 30 min warm-up)
Controls	Push / turn control wheel for stand-by switching and OSD controls
Input connectors	DVI dual channel
Signal systems	Video on DVI: Complying to DVI Rev 1.0 specifications Sync on DVI: Complying to DVI Rev 1.0 specifications
Input signals	Possible resolutions: • 640 x 480 @ 60, 75, 85, 100 Hz • 1600 x 1200 @ 59, 60 Hz • 1200 x 1600 @ 59 Hz
USB standard supported	USB 1.1

Item	Specification
Power source	Input for 12 VDC power supply unit: 90 ~ 264 VAC Input for display: 12 VDC. (The supplied 12VDC power supply must be used)
Power consumption	77 watts (max., at 90 VAC, maximum backlight, USB load)
Dimensions (W x H x D)	In perpendicular vertical position, highest position, tilt = 0°, swivel = 0°: 385 x 585 x 250 mm
Net weight	14 kg
Operating Temperature	Operation: 0°C to 40°C Within specs: 15°C to 35°C
Storage Temperature	-20°C to 60°C
Humidity	8% - 80% (non-condensing) for operation 5% - 95% (non-condensing) for storage
Altitude	7500 m storage 3000 m operation

E-3620:

Item	Specification
Picture panel	20.8-inch TFT AM-LCD IPS dual domain
Resolution	Native: 2048 x 1536
Display area (H x V)	423.9 x 318 (mm)
Viewing angle (@ 10/1 contrast)	Vertical: 170° Horizontal: 170°
Pixel Pitch	0.207 mm (H) x 0.207 mm (V)
Native color resolution	8 bits / sub-pixel

Item	Specification
Luminance	500 cd/m ² (calibrated)
Contrast ratio	900/1 (on/off in dark environment)
Response time	25 ms typical (@ 25° C after 30 min warm-up)
Controls	Push / turn control wheel for stand-by switching and OSD controls
Input connectors	DVI dual channel
Signal systems	Video on DVI: Complying to DVI Rev 1.0 specifications Sync on DVI: Complying to DVI Rev 1.0 specifications
USB standard supported	USB 1.1
Power source	Input for 12 VDC power supply unit: 90 ~ 264 VAC Input for display: 12 VDC. (The supplied 12VDC power supply must be used)
Power consumption	79 watts (max., at 90 VAC, maximum backlight, USB load)
Dimensions (W x H x D)	In perpendicular vertical position, highest position, tilt = 0°, swivel = 0°: 385 x 585 x 250 mm
Net weight	13 kg
Operating Temperature	0°C to 40°C, 15°C to 35°C within specs
Storage Temperature	-20°C to 60°C
Humidity	8% - 80% (non-condensing) for operation 5% - 95% (non-condensing) for storage

MDNG-5121:

Item	Specification
Picture panel	21.3" Dual domain IPS, normally black
Resolution	Native: 2560 x 2048
Display area (H x V)	422.4 x 337.92 mm
Viewing angle (@ 10/1 contrast)	Vertical: 170° Horizontal: 170°
Pixel Pitch	0.165 mm (H) x 0.165 mm (V)
Native color resolution	8 bits / sub-pixel
Luminance	500 cd/m ² (calibrated)
Contrast ratio	800/1 (on/off in dark environment)
Response time	25 ms typical (@ 25° C after 30 min warm-up)
Controls	Push / turn control wheel for stand-by switching and OSD controls
Input connectors	DVI dual channel
Signal systems	Video on DVI: Complying to DVI Rev 1.0 specifications Sync on DVI: Complying to DVI Rev 1.0 specifications
USB standard supported	USB 1.1
Power source	Input for 12 VDC power supply unit: 90 ~ 264 VAC Input for display: 12 VDC. (The supplied 12VDC power supply must be used)
Power consumption	80 watts (max., at 90 VAC, maximum backlight, USB load)

Item	Specification
Dimensions (W x H x D)	In perpendicular vertical position, highest position, tilt = 0°, swivel = 0°: 408 x 591 x 250 mm
Net weight	11.1 kg
Operating Temperature	0°C to 40°C, 15°C to 35°C within specs
Storage Temperature	-20°C to 60°C
Humidity	8% - 80% (non-condensing) for operation 5% - 95% (non-condensing) for storage

Connector pin assignments

DVI connector:

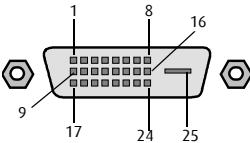


Figure 49: DVI connector pin layout

Pin no.	Signal	Pin no.	Signal
1	TMDS DATA 2-	14	+5V POWER
2	TMDS DATA 2+	15	GND
3	GND	16	HOT PLUG DETECT
4	NC	17	TMDS DATA 0-
5	NC	18	TMDS DATA 0+
6	DDC CLOCK	19	GND
7	DDC DATA	20	NC
8	NC	21	NC
9	TMDS DATA 1-	22	GND
10	TMDS DATA 1+	23	TMDS CLOCK-
11	GND	24	TMDS CLOCK+
12	NC	25	GND
13	NC		

Glossary

Calibration

Each display is calibrated in the factory before it is sent to the customer. After this calibration, black and white luminance are set to the ideal level.

A stabilization routine, constantly active when the display is on, keeps these levels constant using the built-in sensor.

Display Controller head

A display controller (graphics board) converts the digital data from the computer into digital or analog video voltages.

Most of the common display controllers contain just one set of video and sync outputs. However, some high-end boards, like some of the BarcoMed boards, contain two sets of video and sync outputs. This is called a dual head display controller. It is like two complete display controllers implemented on one single unit.

A dual head board in the computer behaves exactly as if two separate boards were installed.

DICOM

DICOM stands for Digital Imaging and Communications in Medicine. It is a standard developed by the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA).

The standard specifies how digital image data can be moved from system to system.

In addition, Supplement 28 Part 14 specifies a function that relates pixel values to displayed Luminance levels and is called Grayscale Standard Display Function.

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Warranty Statement

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ARTICLE 1: SERVICES

BarcoView warrants that the equipment will be free of defects in workmanship or material for the warranty period.

Notwithstanding the provisions of clause 2, repair and replacement of defects in material and/or workmanship under this warranty shall be accomplished in our works in the following manner:

1.1 The Customer, upon the occurrence of any equipment failure, shall contact BarcoView Customer Support Center (or an authorized service center) by telephone, fax or e-mail and shall provide the applicable Customer Support person with a complete description of the problem being encountered, including the model and serial number of the equipment in which the problem has arisen.

1.2 The Customer Support person shall diagnose the problem experienced by the Customer and shall advise the Customer on how to proceed. Customer Support may ask to return the faulty equipment or faulty subassemblies to the BarcoView Customer Support Center (or an authorized service center) for repair activities. The Customer shall ask for a RMA or RAN number to a BarcoView Customer Support Center (or an authorized service center).

1.3 The Customer shall return, freight prepaid, the defective equipment or subassemblies for repair to the BarcoView Customer Support Center (or an authorized service center).

1.4 Replacement parts used shall be new or equivalent to new parts for the revision level of the equipment. The warranty period for the replacement parts will expire at the same moment as the original warranty period of the equipment. All parts replaced hereunder and returned to BarcoView (or an authorized service center) shall become the property of BarcoView (or the authorized service center).

1.5 The repaired equipment shall be returned to the Customer, by regular freight, at BarcoView's charge.

ARTICLE 2: ITEMS EXCLUDED FROM WARRANTY

The warranty described herein shall not include the following:

- 2.1 Any hardware or software item procured from a source other than BarcoView or their official agent or distributor and integrated by Customer or a third party into BarcoView supplied equipment.
- 2.2 Any host configuration not explicitly supported by BarcoView.
- 2.3 All software installed on the system, whether they are acquired from BarcoView or third party. An exception is made for software delivered by BarcoView that would prove to be a cause for the malfunctioning of the hardware covered under this Agreement.
- 2.4 Normal wear and tear, use under circumstances exceeding specifications, abuse, unauthorized repair or alternation, lack of proper maintenance.
- 2.5 Any failures resulting from an accident, negligence (such as but not limited to removing or deleting system files & licensed software product files), misuse, circuit failure or any change, damage due to fire, water, thunder or lightning, power failure or fluctuation, disruption of communication lines or due to force majeure, or any reason foreign to the equipment.
- 2.6 Any specific services or procedures, asked for by Customer, related to verification of repaired equipment.

ARTICLE 3: OBLIGATIONS OF THE CUSTOMER

Customer hereby assumes the following obligations as partial consideration for BarcoView performance of its requirements under the warranty condition; failure by Customer to meet its obligations under this paragraph shall excuse BarcoView's performance hereunder:

- 3.1 Customer shall not expose BarcoView personnel to any unsafe working conditions.
- 3.2 Repairs to equipment under warranty resulting from improper maintenance or repair performed by the Customer, or its officers,

agents, employees, or representatives, shall be borne by the Customer at its additional cost and expense.

3.3 The customer is responsible for installing the BarcoView equipment in an environment for which it was intended. If there is an indication that the equipment was used - even temporary - outside its specifications, BarcoView is entitled not to perform warranty repairs and terminate the warranty agreement. Any actions that have been taken by BarcoView in this respect, may be invoiced to the Customer at normal pricing.

ARTICLE 4: MODIFICATIONS OR CHANGES TO THE EQUIPMENT

Customer may make additions to the equipment only with explicit written consent of BarcoView.

Any attempt to do so, voids the warranty.

ARTICLE 5: DISCLAIMER OF WARRANTIES

Barcoveview disclaims all warranties, expressed or implied, including all implied warranties of merchantability and fitness for a particular purpose.

ARTICLE 6: LIMITATION OF LIABILITY

Barcoveview shall not under any circumstances be liable to customer or any third party for direct, indirect, incidental, special or consequential damages, such as but not limited to, damage to or loss of tangible or intangible property or equipment, loss of profits or revenues, cost of capital, cost of purchase of replacement goods, or claims of customers of user for service interruptions. The liability of BarcoView for manufacturing, sale, delivery, resale, installation, operation or suitability for use of any products or services covered by or furnished under this warranty condition, whether arising out of contract, negligence, strict tort, warranty or otherwise, shall not exceed the price of the item or items of goods or services upon which such liability is based.

ARTICLE 7: FORCE MAJEURE

Either party shall be released from performance of its obligations under this agreement to the extent, and for so long as, the performance of

this agreement is impeded by reason of force majeure. For the purposes of this clause the expression “force majeure” means, but shall not be limited to, industrial dispute, fire, mobilization, requisition, embargo, currency transfer prohibitions, insurrection, lack of means of transport, restrictions of the use of energy, and generally any circumstances which are beyond the control of the parties and hinder performance by one party of his obligations.

ARTICLE 8: GENERAL

8.1 Customer acknowledges its understanding that all software and electronic devices, including BarcoView products are subject to possible error, mechanical or electrical failure, and should not be relied upon in inappropriate applications or without proper backup and/or other safety precautions whenever personal injury or property damage may result from failure or error of the product.

8.2 BarcoView shall not be responsible for machine failure and/or its failure to render service or maintenance due to causes beyond its reasonable control.

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